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VENABLE LLP
P.O. BOX 34385
WASHINGTON, DC 20043-9998

EXAMINER	
LEE, SHUN K	

ART UNIT	PAPER NUMBER
2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,334	HOPKINS ET AL.	
	Examiner	Art Unit	
	Shun Lee	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2007 and 20 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26-28 and 32-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-28 and 32-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 November 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20050902*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

National Stage Application

Claim Objections

1. Claims 26, 42, 43, and 46-48 are objected to because of the following informalities:

(a) in claim 26, "at near normal incidence" on lines 6-7 should probably be deleted (since radiation is not incident on the source);

(b) in claim 26, "light" on line 11 (and also on lines 13, 17, and 22) should probably be --the emitted radiation-- (see "the emitted radiation" on line 8 in claim 26);

(c) in claim 42, "a planar reflector" on line 2 should probably be --said second surface-- (see "a second surface" on line 16 in claim 26);

(d) in claim 43, "the planar reflector" on lines 1-2 should probably be --said second surface-- (see "a second surface" on line 16 in claim 26);

(e) in claim 46, "light" on line 2 should probably be --the emitted radiation-- (see "the emitted radiation" on line 8 in claim 26);

(f) in claim 47, "light" on line 3 should probably be --the emitted radiation-- (see "the emitted radiation" on line 8 in claim 26); and

(g) in claim 48, "light" on line 3 should probably be --the emitted radiation-- (see "the emitted radiation" on line 8 in claim 26).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 26-28 and 32-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The term "narrow" in claim 26 is a relative term which renders the claim indefinite. The term "narrow" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specification discloses (pg. 12, lines 1-4) that "The light source and detector are preferably matched pairs in the sense that their construction and angles of emission and collection are much the same, for example 10-12 degrees, preferred choices are LEDs or photodiodes". First it should be noted that the units of solid angle (a solid angle is defined[1] as "the three-dimensional angular spread at the vertex of a cone measured by the area intercepted by the cone on a unit sphere whose center is the vertex of the cone") is not degrees. Thus an example of the light source and detector's solid angle was provided (*i.e.*, an exemplary solid angle formed by an emission and collection angle 10-12º). However, the specification does not provide a criteria for distinguishing a "narrow solid angle" from a solid angle that is not "narrow".

5. The term "near" in claim 26 is a relative term which renders the claim indefinite. The term "near" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specification does not provide a

[1] Merriam-Webster's Collegiate Dictionary 10th Edition

criteria for distinguishing a "near normal incidence" from an angle that is not "near normal incidence".

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 26-28, 32-34, and 37-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parry *et al.* (US 5,973,326) in view of McCaul *et al.* (US 5,625,189) and Weiner (US 4,024,397) in so far as understood.

In regard to claims **26-28, 32**, and **33**, Parry *et al.* disclose (Figs. 1 and 2) a gas sensor including a housing (2) defining a chamber, comprising:

(a) an optical source (5) arranged in the chamber to provide radiation having a predetermined directional range (Fig. 3; column 4, lines 9-12) along an optical path within the chamber;

(b) a detector (6) arranged in the chamber to detect the emitted radiation along the optical path;

(c) at least two reflective surfaces (7, 8), each including an ellipsoidal surface (column 3, lines 32-36) arranged along the optical path to reflect light from the source (5) to the detector (6);

(d) a first planar surface (9) arranged along the optical path to reflect light from one of the at least two reflective surfaces (7, 8) to another of the at least two reflective surfaces (7, 8);

(e) a second surface (3) including at least two reflective regions arranged along the optical path to reflect light between a respective one of the at least two reflective surfaces (7, 8) and the first planar surface (9);

wherein the detector (6) is operative (*i.e.*, wall 10 and additional shielding; column 3, lines 60-63) to detect radiation only from a predetermined directional range such that only light transmitted through the optical path via the at least two reflective surfaces (7, 8) is detected by the detector (6).

The sensor of Parry *et al.* lacks an explicit description that the radiation is emitted at a narrow solid angle (substantially centered on an axis of the source) at near normal incidence and that the detector with an optical element (comprising an immersion lens) is operative to select and detect radiation at near normal incidence at the narrow solid

angle (substantially centered on an axis of the detector) of acceptance for the detector. However, Parry *et al.* also disclose (column 1, lines 55-57) that any source or detector may be used. Since Parry *et al.* do not disclose and/or require a specific spatial emission pattern emitted from a specific source, one having ordinary skill in the art at the time of the invention would reasonably interpret the unspecified source of Parry *et al.* as any one of the known conventional sources that did not require a detailed description. Further, McCaul *et al.* teach (column 22, line 25 to column 23, line 12; Figs. 24-28) that a source for a gas sensor is a commercially available vertical cavity surface emitting semiconductor laser that emits a beam (2111) having a narrow solid angle substantially centered on a normal axis of the laser. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a conventional source (*e.g.*, a commercially available laser having a narrow solid angle substantially centered on a normal axis of the laser) as the unspecified source in the sensor of Parry *et al.* Further, since Parry *et al.* do not disclose and/or require a specific detector, one having ordinary skill in the art at the time of the invention would reasonably interpret the unspecified detector of Parry *et al.* as any one of the known conventional detectors that would not require further description. Further, Weiner teaches (column 1, lines 6-27) that an immersed infrared detector provides increase detectivity. It should be noted that a lens inherently have a field of view less than 4π steradians. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a conventional detector (*e.g.*, an immersed

infrared detector having a desired field of view such as a substantially centered on a normal axis of the detector) as the unspecified detector in the sensor of Parry *et al.*

The claim limitation "means for admitting gas into the chamber" is being treated under 35 U.S.C. 112, sixth paragraph and has been construed to cover the corresponding structure (*i.e.*, "regions 17" and "inlet 18" as illustrated in Figs. 1 and 1a) described in the specification (*e.g.*, "regions 17 of the cylindrical wall 3 not providing reflective surfaces for the light may include particulate filters, mesh or sintered material" in lines 10-28 on pg. 9) and equivalents thereof (MPEP § 2181).

In regard to claim **34** which is dependent on claim 26, Parry *et al.* also disclose that the chamber comprises gas admittance means (*i.e.*, apertures or openings; column 3, lines 25-28 and 58-60) for admitting gas into the chamber.

In regard to claim **37** which is dependent on claim 26, Parry *et al.* also disclose (Figs. 1-3) that the at least two reflective surfaces (7, 8) define foci (column 3, line 64 to column 4, line 35) at which the source (5) and detector (6) are located.

In regard to claim **38** which is dependent on claim 26, Parry *et al.* also disclose (Figs. 1-3; column 3, line 64 to column 4, line 35) that the optical source (5) is at a focus of a first part ellipsoidal surface (a) and the detector (6) is at a focus of a second part ellipsoidal surface (b) and the first and second ellipsoids share a common virtual focus (12).

In regard to claim **39** which is dependent on claim 26, Parry *et al.* also disclose (Figs. 1 and 2; column 3, lines 16-18) that the optical source (5) and the detector (6) are contained within a flameproof housing (2).

In regard to claim **40** which is dependent on claim 26, Parry *et al.* also disclose (Figs. 1 and 2) that the housing (2) comprises a cylinder having end walls (3, 4).

In regard to claim **41** which is dependent on claim 40, Parry *et al.* also disclose (Figs. 1 and 2) that the optical source (5) and the detector (6) are mounted on a common first end wall (4) of the housing (2).

In regard to claims **42-44** which are dependent on claim 41, the sensor of Parry *et al.* lacks an explicit description that a planar reflector comprises a central region of a second end wall and a gas admittance means comprises a peripheral region of the second end wall and a region of the cylinder adjacent the second end wall. However, Parry *et al.* also disclose (column 1, line 66 to column 2, line 6; column 3, lines 25-28 and 58-60) to provide discontinuous reflective coatings on curved regions (7 and 8 in Fig. 1) and planar regions (3 and 9 in Fig. 1) and apertures or openings for admitting gas into the chamber. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide apertures at locations (*e.g.*, at peripheral region of the second end wall and a region of the cylinder adjacent the second end wall) that would not interfere with the reflectors (*e.g.*, planar reflector 3 at a central region of a second end wall) in the sensor of Parry *et al.*

In regard to claim **45** which is dependent on claim 26, Parry *et al.* also disclose (column 3, lines 18-21) that the optical source is an infrared source.

In regard to claim **46** which is dependent on claim 26, Parry *et al.* also disclose (column 2, lines 21-26) that the optical source is arranged to heat substantially all the surfaces from which light is reflected to a temperature above ambient temperature.

In regard to claim **47** which is dependent on claim 26, Parry *et al.* also disclose (Figs. 1 and 2) a reference detector (11) located adjacent the detector (6) so that the reference detector (11) and the detector (6) collect light that has traveled similar optical paths.

In regard to claim **48** which is dependent on claim 47, the sensor of Parry *et al.* lacks an explicit description that one of the two reflective surfaces is shaped so as to form portions of a pair of overlapping part ellipsoidal surfaces, whereby light traveling from the optical source to the detector and reference detector travels the same optical path as far as the pair of overlapping part ellipsoidal surfaces and is split for the last portion of the distance. However, Parry *et al.* also disclose (column 3, lines 54-56) to provide a reference sensor to compensate for changes in operating conditions and with time. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a pair of overlapping part ellipsoidal reflective surface surfaces in the sensor of Parry *et al.*, in order for the reference detector to have the same optical geometry as the measurement detector so as to compensate for changes in operating conditions and with time.

In regard to claim **49** which is dependent on claim 26, the sensor of Parry *et al.* lacks an explicit description t that the second surface further comprises at least one of a foraminous surface or an aperture for admittance of gas arranged between the at least two reflective regions. However, Parry *et al.* also disclose (column 1, line 66 to column 2, line 6; column 3, lines 25-28 and 58-60) to provide discontinuous reflective coatings on curved regions (7 and 8 in Fig. 1) and planar regions (3 and 9 in Fig. 1) and

apertures or openings for admitting gas into the chamber. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide apertures at locations (*e.g.*, arranged between the at least two reflective regions) that would not interfere with the reflectors in the sensor of Parry *et al.*

In regard to claim **50** which is dependent on claim 26, Parry *et al.* also disclose (column 1, line 66 to column 2, line 6; column 3, lines 25-28 and 58-60) that the at least two reflective regions of the second surface are separated by a non-reflective region (*i.e.*, discontinuous reflective regions).

9. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parry *et al.* (US 5,973,326) in view of McCaul *et al.* (US 5,625,189) and Weiner (US 4,024,397) as applied to claim 34 above, and further in view of Wong (US 5,384,640) and Wilkins *et al.* (US 3,749,495) in so far as understood.

In regard to claim **35** which is dependent on claim 34, the modified sensor of Parry *et al.* lacks an explicit description that the gas admittance means includes sintered material. However, Parry *et al.* also disclose (column 3, lines 25-28 and 58-60) apertures or openings for admitting gas into the chamber. Since Parry *et al.* do not disclose and/or require a specific gas aperture, one having ordinary skill in the art at the time of the invention would reasonably interpret the unspecified gas aperture of Parry *et al.* as any one of the known conventional gas apertures that would not require further description. Further, Wong teaches (column 3, lines 47-57) that an aperture comprises a semipermeable membrane (*i.e.*, a particulate filter) for keeping large particles from entering the gas sensor. In addition, Wilkins *et al.* teach (column 5, lines

20-24) that particulate filters comprising sintered material are commercially available. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a conventional aperture (*e.g.*, an aperture comprising sintered material) as the unspecified aperture in the modified sensor of Parry *et al.*, in order to keep large particles from entering the gas sensor.

10. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parry *et al.* (US 5,973,326) in view of McCaul *et al.* (US 5,625,189) and Weiner (US 4,024,397) as applied to claim 34 above, and further in view of Wong (US 5,384,640) in so far as understood.

In regard to claim **36** which is dependent on claim 34, the modified sensor of Parry *et al.* lacks an explicit description that the gas admittance means includes a particulate filter. However, Parry *et al.* also disclose (column 3, lines 25-28 and 58-60) apertures or openings for admitting gas into the chamber. Since Parry *et al.* do not disclose and/or require a specific gas aperture, one having ordinary skill in the art at the time of the invention would reasonably interpret the unspecified gas aperture of Parry *et al.* as any one of the known conventional gas apertures that would not require further description. Further, Wong teaches (column 3, lines 47-57) that an aperture comprises a semipermeable membrane (*i.e.*, a particulate filter) for keeping large particles from entering the gas sensor. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a conventional aperture (*e.g.*, an aperture comprising a particulate filter) as the unspecified aperture in

the modified sensor of Parry *et al.*, in order to keep large particles from entering the gas sensor.

Response to Arguments

11. Applicant's arguments filed 20 November 2007 have been fully considered but they are not persuasive.

Applicant argues (first paragraph on pg. 9 to second paragraph on pg. 10 of remarks filed 20 November 2007) that Parry *et al.*'s source 5 is omnidirectional and Parry *et al.* do not suggest using an alternative embodiment in which the source 5 is not omnidirectional. Examiner respectfully disagrees. Parry *et al.* do not teach that a specific spatial profile for the radiation emitted from source is required for the invention. Further, there does not appear to be any express disclosure within Parry *et al.* that source 5 must be omnidirectional. On the contrary, Parry *et al.* state (column 3, line 64 to column 4, line 17) that "FIG. 3 is an explanatory diagram in section illustrating the equality of optical path length for light emitted in different directions achievable by employing the invention. ... The path of optical radiation from the source 5 is shown and, in the absence of the reflective surface 3 and assuming that the ellipse a were continuous, would be focussed at the second focus 12 ... ". The key phrase is "path of optical radiation from the source 5 is shown". Thus, Parry *et al.* expressly illustrate in Fig. 3 the path of optical radiation from the source 5. Therefore, Parry *et al.* do not require an omnidirectional source. Rather, Parry *et al.* teach a source 5 that emits light in a predetermined directional range (in at least the embodiment illustrated in Fig. 3).

Applicant also argues (second paragraph on pg. 10 of remarks filed 20 November 2007) that the part-ellipsoidal surfaces 7, 8 would have to be large enough such that the surface 7 can reflect a substantial portion of the radiation being emitted from the source 5 onto the same point on the reflective section 9 and the surface 8 has to be large enough to reflect a substantial portion of the radiation reflected from the reflective section 9 onto the sensor 6. Examiner respectfully disagrees. There does not appear to be any teaching or suggestion within the cited column 3, line 64 to column 4, line 35 of Parry *et al.* that ellipsoidal reflective surfaces 7, 8 must be of a certain size. On the contrary, Parry *et al.* teach a source 5 that emits light in a predetermined directional range (in at least the embodiment illustrated in Fig. 3).

Applicant also argues (second paragraph on pg. 10 of remarks filed 20 November 2007) that there is no motivation for one of ordinary skill to modify Parry *et al.*'s system to use an optical source or detector that is not omnidirectional since the ellipsoidal reflective regions 7 and 8 of Parry *et al.* that extend from the top reflective surface 3 to the bottom reflective surface 9 would be futile. Examiner respectfully disagrees. There are obvious design and manufacturing considerations that determine final reflector size. For example, the cost, material, and/or manufacturing technique used may be factors that determine actual reflector size. In this case, Parry *et al.* state (column 1, line 66 to column 2, line 7) that "The reflective surfaces of the reflector means may be discontinuous in two or more discrete sections or present a continuous surface. In a preferred embodiment, the reflector means includes curved regions and planar regions to provide a compact arrangement. Preferably, the reflective surfaces are defined by interior

surfaces of the chamber. The chamber may have polished walls or have a reflective coating laid down on it for example. The chamber may be fabricated by machining from a solid block of material, for example". Thus the ellipsoidal reflective regions 7 and 8 of Parry *et al.* that extend from the top reflective surface 3 to the bottom reflective surface 9 simply reflects an embodiment wherein the chamber is fabricated from a solid block of material with the reflective surfaces defined by interior surfaces of the chamber. Further, Parry *et al.* expressly teach discontinuous reflective surfaces. Thus Parry *et al.* also suggest embodiments wherein the ellipsoidal reflective regions 7 and 8 does not extend from the top reflective surface 3 to the bottom reflective surface 9 (*i.e.*, reflective surfaces 3, 7, 8, and 9 are discontinuous).

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Porta/
Supervisory Patent Examiner, Art Unit 2884